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ABSTRACT

Whether we use technology with young children--and if so, how--are critical issues facing early childhood educators and parents. This Digest points out that many researchers do not recommend that children under 3 years old use computers. The Digest also notes that many educators use computers with young children in ways that are developmentally inappropriate. However, developmentally appropriate ways to use computers with 3- and 4-year-olds are different from the ways computers are used in kindergarten and the primary grades. Research has shown that the cognitive and social benefits of providing computers to young children vary depending upon the kind of computer experiences offered. The Digest suggests, as a first step to integrating computers in classrooms, organizing a study group of all the individuals who have expressed interest in children using computers, then summarizing the benefits of using computers with young children, and discussing goals for the year, including the cost of computers and teacher training. The Digest identifies four critical components of teacher training: practical experience, workshops, models and mentors, and supervisory follow-up. (Contains 13 references.) (LPP)

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Computers and Young Children

Susan W. Haugland

Whether we use technology with young children—and if so, *how*—are critical issues facing early childhood educators and parents. This Digest discusses questions about when children should start using computers; developmentally appropriate computer activities in preschool, kindergarten, and early primary classrooms; benefits of computer use; integration of computers into classrooms; and teacher training.

When to Introduce Children to Computers

Many researchers do not recommend that children under 3 years old use computers (e.g., Hohmann, 1998). Computers simply do not match their learning style. Children younger than 3 learn through their bodies: their eyes, ears, mouths, hands, and legs. Although they may return over and over again to an activity, they are full of movement, changing focus frequently. Computers are not a good choice for the developmental skills these children are learning to master: crawling, walking, talking, and making friends.

Developmentally Appropriate Computer Activities

Unfortunately, computers are used all too often in ways that are developmentally inappropriate. One study (U.S. Congress, 1995) found that while "schools are steadily increasing their access to new technologies . . . most teachers use these technologies in traditional ways, including drills in basic skills and instructional games" (p. 103). Clements (1994) makes a similar point, noting, "What we as early childhood educators are presently doing most often with computers is what research and NAEYC guidelines say we should be doing least often" (p. 33).

Papert (1998) stresses that computers have an impact on children when the computer provides concrete experiences, children have free access and control the learning experience, children and teachers learn together, teachers encourage peer tutoring, and teachers use computers to teach powerful ideas.

Developmentally appropriate ways to use computers with 3- and 4-year-olds are different from the ways we use computers in kindergarten and the primary grades.

Computers and Preschoolers. Children 3 and 4 years of age are developmentally ready to explore computers, and most early childhood educators see the computer center as a valuable activity center for learning. Timing is crucial. Children need plenty of time to experiment and explore. Young children are comfortable clicking various options to see what is going to happen next. Teachers may want to intervene when children appear frustrated or when nothing seems to be happening. Frequently, just a quick word or two, even from across the room, reminds children what they need to do next to reach their desired goal. Providing children with minimal help teaches them they can operate the computer successfully. In addition, by observing what children are doing, the teacher can ask probing questions or propose problems to enhance and expand children's computer experiences.

Computers for Kindergartners and Early Primary Children. As children enter kindergarten and the primary grades, it is important that they continue to have access to a computer center with a library of developmentally appropriate software. Children need opportunities to make choices about some of their computer experiences. In addition, kindergarten or primary-grade teachers will want to use the computer for more directed activities that match their learning objectives. For example, to enhance language skills, children can compose a letter to a friend or relative using the template provided in ClarisWorks for Kids or similar software.

Children could also work in small groups. For example, one group might use software such as Scholastic's Magic School Bus Explores the Rainforest to compare two of the seven ecozones in the program. Using software such as Edmark's Kids' Desk: Internet Safe, other small groups can investigate these two ecozones on Internet Web sites selected by the teacher. The groups might then merge to share their discoveries and write a report on the ecozones, illustrating each with pictures drawn by members of the group or downloaded from the Internet sites. Through exploring computer experiences, these children build memory skills, learn how to seek out information from multiple sources until they have a clear understanding of ecosystems, and integrate their knowledge of how each ecosystem functions. In the process, they learn to delegate responsibility, interact with others, solve problems, and cooperate to reach a goal.

Benefits of Computer Use

Research has shown that 3- and 4-year-old children who use computers with supporting activities that reinforce the major objectives of the programs have significantly greater developmental gains when compared to children without computer experiences in similar classrooms—gains in intelligence, nonverbal skills, structural knowledge, long-term memory, manual dexterity, verbal skills, problem solving, abstraction, and conceptual skills (Haugland, 1992).

The benefits of providing computers to kindergarten and primary-grade children vary depending upon the kind of computer experiences offered and how frequently children have access to computers. The potential gains for kindergarten and primary children are tremendous, including improved motor skills, enhanced mathematical thinking, increased creativity, higher scores on tests of critical thinking

and problem solving, higher levels of what Nastasi and Clements (1994) term *effectance motivation* (the belief that they can change or affect their environment), and increased scores on standardized language assessments.

In addition, computer use enhances children's self-concept, and children demonstrate increasing levels of spoken communication and cooperation. Children share leadership roles more frequently and develop positive attitudes toward learning (Clements, 1994; Cardelle-Elawar & Wetzel, 1995; Adams, 1996; Denning & Smith, 1997; Haugland & Wright, 1997; Matthew, 1997).

Integration of Computers into the Classroom

Early childhood programs serve diverse populations and have different schedules, curriculums, staffing patterns, resources, and so on. Goals for computer use and the steps that schools take to integrate computers into their classrooms may be completely different but equally successful.

A viable beginning is for teachers, administrators, and parents to share magazine, journal, and newspaper articles they have seen regarding children using computers. A study group of all the individuals who have expressed interest in children using computers can then be organized. The next step is to summarize the benefits of using computers with young children and to discuss goals for the year, including the cost of computers and teacher training.

A first goal may be obtaining computers. The ratio of computers to young children is important—at most 1 to 7, preferably 1 to 5. If this ratio cannot be met with the resources available, it is far better to use a set of computers in a classroom for a month, quarter, or semester and then rotate them to another classroom. Equal access for children is essential; even the most talented teacher will have difficulty integrating computers into his or her classroom with only one computer.

To help in computer selection, the study group can seek out mentors who have expertise using computers. These mentors might be teachers currently using computers, a professor at a college, or leaders in business. The study group may also want to brainstorm possible fund-raising activities and explore the possibility of obtaining used computers from businesses—making sure the computers have the capacity to run software that is currently being marketed for young children.

Teacher Training

Teacher training is essential for computers to be an effective teaching tool. A recent report reveals that only a few teachers in a relatively small number of schools have been trained to maximize technology use in classrooms (Gatewood & Conrad, 1997). Training opportunities enable teachers to build skills and confidence and learn strategies to integrate computers into their curriculum. Epstein (1993) identified four critical components of training: practical experience, workshops, models and mentors, and supervisory follow-up.

As a first step, teachers can explore software that is developmentally appropriate for their classrooms. Teachers can then discuss the potential learning objectives of the programs and activities they could use to integrate particular software into their classrooms. Teachers can also participate in workshops that integrate the developmental theory and research regarding computer use with hands-on experiences. Mentors can also provide teachers with affirmation, support, and suggestions for classroom use.

As teachers implement technology in the classroom, their vision of the role of technology in teaching and learning will undoubtedly change. Administrators need to continually support teachers in their quest to discover how technology can best enhance children's learning.

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For More Information

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